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The Effects of Phenothiazine on Young Pigs

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The first of the experiments recorded here was done in 1939 to find out whether therapeutic doses of phenothiazine could be safely given to young pigs by mixing the total dose for a group of pigs with the total food for that group and allowing all the pigs to eat as much of the drugged food as they could get. By this method of mass dosage there is no control of the dose received by each pig, but if the method were efficient and safe, it would economise the pig-breeder's time and labour costs. Subsequently individual doses of phenothiazine were given to other pigs of various ages to test the toxicity of the drug to these animals.

REVIEW OF THE LITERATURE

Harwood, Jerstad and Swanson (1938) gave in the food varying doses of phenothiazine to five pigs, the age of which is not recorded. No ill effects were seen. Swanson, Harwood and Connelly (1940) gave both conditioned phenothiazine, containing a substance which rendered the preparation suitable for use as an insecticide, and unconditioned phenothiazine, freed from this substance by recrystallisation, to pigs in the food and in capsules. No toxic effects were recorded after doses varying from 0·25 to 0·9 gramme per lb. body weight of the conditioned product or two doses of 0·05 to 0·2 g. per lb. body weight of the recrystallised phenothiazine. In addition to this, 40 pigs, whose age and weight are not recorded, were fasted for 24 hours and then given a mass dose in the trough of 1 lb. of conditioned phenothiazine with 4 lb. of food (0·5 g. per lb. live weight). The drugged food was promptly eaten and no toxic effects were noted. To each of five other pigs weighing 300-495 lb. these workers gave 300 g. of conditioned phenothiazine in various feeds and they do not state that the pigs refused this drugged food. In three of the pigs a mild enteritis developed (*cf.* Rietz below), but enteritis was also found in one of the controls, so that the authors concluded that it was doubtful whether the enteritis was due to the phenothiazine. Two pigs weighing 250 and 300 lb. respectively were given individually 300 g. of conditioned phenothiazine in 1,200 g. of food on 23.11.38; the same dose was again given on 26.11.38, 30.11.38 and 13.12.38. The pigs were killed on 19.12.38 and the autopsy showed a moderately severe enteritis and nephritis, both of which were, in the opinion of the authors, "apparently due to the action of the drug." This was hardly surprising after 1,200 g. of phenothiazine had been given within 20 days. It is possible that the mechanical action alone of such a bulk of insoluble material would cause an enteritis. When the writer (1940) and Mr. Day gave a mare 9 years old 1,000 g. of ground-up phenothiazine tablets by stomach tube, the autopsy showed numerous acute haemorrhagic erosions in the fundus of the stomach and areas of mucosal necrosis and ulceration in the renal pelves and ureters, which Innes and Whittick (1940) considered to be due to the toxic action of the drug. Swanson *et alia* (1940) add that their pigs "ate the drug mixtures with comparatively little hesitation." Their pigs were much older pigs than those used for the writer's experiments recorded below.

Subsequently Swanson *et alia* gave a pig weighing 150 lb. a dose of 30 g. of phenothiazine in gelatin capsules in the morning, 70 g. immediately after this in a feed of tankage and corn meal, which was readily eaten, and 50 g. in tankage and corn meal on the afternoon of the same day, which was also readily eaten. No symptoms followed and at autopsy only a mild enteritis was found.

Roberts (1941), using phenothiazine in the form of "Phenovis," which contains 90 per cent. of the drug, gave doses of 4·4 to 78 g. of phenothiazine to 14 pigs (0·2 to 2 g. per lb. live weight). Some pigs were starved for 16 hours before the dose was given in the food; the others were given a suspension of the drug in water without a previous fast. The drug was readily eaten in the food, provided that not more than 20 g. was given in a single dose. Pigs receiving 0·2, 0·3 and 0·4 g. per lb. live weight (4·4 to 20·4 g.) showed no ill effects beyond a tendency to constipation and a distaste for food for about 24-48 hours. Higher doses (0·8 to 2·0 g. per lb.) produced toxic effects. One pig given 41·6 g. (0·8 g. per lb.) showed slight inco-ordination of its hindquarters about 16 hours after the dose; its appetite was depressed for about 48 hours; but it had recovered completely by the third day. One pig given 37 g. (1 g. per lb.) showed only loss of appetite lasting about two days. One pig given 75 g. (1·5 g. per lb.) showed wobbly gait about 16 hours after the dose, which lasted for about five days and was accompanied by loss of appetite, depression, weakness and constipation. One pig given 78 g. (2 g. per lb.) reacted very similarly to the preceding one given 75 g., but the effects were more severe. Autopsy done on the fourth day after the dose (the author does not say whether this pig died or whether it was killed) revealed marked inflammation and some ulceration of the stomach, patchy inflammation of the small intestine, enlargement and darkening of the colour of the liver and slight congestion of the kidney. One pig weighing 64 lb. was given 10 g. per day of phenothiazine for ten consecutive days, but no toxic effects were observed; slight constipation was the only effect noted. Roberts concludes that phenothiazine at dose rates up to 0·4 g. per lb. pig weight is tolerated fairly well by pigs, the only ill effects being transient loss of appetite and constipation. At higher dose rates toxic effects appear, inco-ordination, similar to that noted by Roberts in calves, being the most interesting of these. Roberts does not state the weights and ages of all the pigs he used, but, by inference from the dose rates, they weighed, where other weights are not stated, between 37 and 52 lb., and thus did not differ markedly in weight from the pigs used by the writer for the experiments recorded below.

The only other papers on the administration of phenothiazine to pigs of which the writer is aware are the recent ones by Rietz (1942), Thorning, Morrill and Boley (1942), Lekwa (1941) and Boley, Levine, Wright and Graham (1941). Boley *et alia* (1941) gave phenothiazine in the food to 26 pigs. They could not, by their method of dosing, estimate the exact dose received by each pig, but 14 pigs weighing 80-150 lb. received about 20 g. each and 12 weighing 120 lb. received about 24 g. All the pigs were fasted before the dose. No ill effects are recorded. Thorning *et alia* (1942) report toxic symptoms similar to, but more severe than, those recorded below by the writer. Excellent photographs of their pigs emphasise their description of the toxic effects. The toxic symptoms shown by these pigs indicated, in the opinion of these authors, "central nervous system derangement." They say that "pigs able to stand showed inco-ordination with marked weaving of the hindquarters when they walked. A few tilted their heads to the side and were unable to progress in a straight line. A number of the animals which were down showed complete posterior paralysis, while others made repeated attempts to rise or made running motions as they lay on their sides. Still others were semi-comatose. The appetite was not greatly impaired, for when supported at the feed or watering trough the pigs ate and drank eagerly. Some, even though they suffered from posterior paralysis, were able to drag themselves to the feed and water troughs." These pigs were about the same weight and age as those used for the writer's experiments. There were 112 of them and they weighed 10-30 lb. (average weight 20 lb.). Soon after weaning their owner gave them a mass dose in the food corresponding to 8·11 g. per pig; this dose corresponds to the dose of 0·2 g. per lb. given by the writer in his experiment 1 and it was given after a fast of 30 hours. Toxic symptoms were first noticed five hours after the dose. About ten hours after the dose only 12 pigs could stand up. Thirty hours after the dose half the pigs could again walk and two days after the dose all were on their feet except 26 of them, which could not get up; two of these 26 died. Many of the pigs described by Thorning *et alia* developed extensive corneal opacity 48 hours after treatment; most of the pigs suffering from this had, however, recovered from it by the sixteenth day, although six of them suffered longer; both unilateral and bilateral keratitis were seen. Examination of the blood revealed nothing abnormal.

Lekwa's (1941) paper is brief and he does not state the dose of phenothiazine given. He records transient nervous symptoms and paralysis in some of the dosed pigs. Some individuals did not show these symptoms until two days after the dose. There was no inflammation of the intestine and no anaemia. Deaths were few.

Rietz (1942) records the administration of 5 g. of phenothiazine as a drench to each of 31 pigs 4 weeks old without any toxic effects. When 16 others of the same age were also given the same dose in the same way the familiar toxic effects followed. The day after the dose all had "lost their equipoise and power of co-ordination of movement. None could walk more than a few feet without falling; those that attempted to walk moved sideways or more or less in a circle, the feet being thrown too high off the ground. Some were prostrate in the position of opisthotonos. The eyes showed constant spasmodic movement. When held up to the sow's nipples, some of them would nurse. Excepting two that died, all had recovered within 72 hours and most of them were apparently normal within 48 hours after treatment. Autopsy of the two dead pigs failed to show any lesions that could be regarded as diagnostic." Rietz further records that phenothiazine was given to eight litters 8 weeks old (45 pigs) and a severe dermatitis resembling advanced scabies appeared among them. The skin was scaly, thickened and cracked and the ears were oedematous, but no mites were found. Seven of the most severely affected ones died and the autopsies showed necrotic enteritis of the caecum and colon, some damage in the small intestine and slight congestion of the kidneys. Only a few parasites other than *Trichuris* were found. From seven other litters 41 pigs aged 4 weeks were each given 4 g. of phenothiazine as a drench. Only four of these showed nervous symptoms and inco-ordination of movement and all of these were apparently normal in 48 hours. None of these 41 pigs showed dermatitis or necrotic enteritis. Rietz says that, while the evidence is inconclusive, phenothiazine may have been the cause, or a contributory cause, of the nervous disorder, dermatitis and necrotic enteritis. One may agree that it may have caused the nervous symptoms, but it seems doubtful whether the dermatitis

or the necrotic enteritis were associated with the phenothiazine. Davey and Innes (1942) suggest that the dermatitis may have been due to photosensitisation, to which DeEds and his co-workers attribute symptoms resembling sunburn recorded by Newcomer (1937) in men using a suspension of phenothiazine as a spray for the control of the codling moth.

THE WRITER'S EXPERIMENTS

Experiment 1. 2.11.39. Three groups of ten pigs aged 12 weeks; average live weight 35 lb. Treated on the farm. All were given ground-up tablets of phenothiazine without a previous fast.

Group A.—Dose 0·5 g. per lb., not repeated. Dosed individually. The day after the dose one pig was unconscious, lying down, waving its legs in the air; it recovered on the fourth day after the dose. The other pigs were similarly, but less severely affected, showing drunken gait and weakness of the hind legs; all recovered.

Group B.—Total dose for the group mixed with their food. The day after receiving 0·2 g. per lb. live weight one pig only showed weakness of the hind legs. The dose was repeated the following day. The day after this six pigs showed complete loss of co-ordination, but all had recovered the next day.

Group C.—Mass dose as for Group B. No ill effects were seen the day after 0·1 g. per lb. live weight. The dose was repeated the following day. The day after this four pigs showed slight inco-ordination and slight rolling gait. All recovered.

Experiment 2. 8.6.40. Twenty-seven pigs 12 weeks old; average live weight 42 lb. These pigs were given ground-up tablets individually in the food at a dose rate of 0·1 g. per lb. live weight. They were fasted before the dose for 24 hours. None showed any ill effects. Detailed analysis of the food intake of these pigs showed no effect on it attributable to phenothiazine.

Experiment 3. 6.6.40. One pig weighing 61 lb. and one weighing 37 lb. from the same herd as those used for Experiment 2 were dosed individually with ground-up tablets without a preliminary fast. No toxic effects followed doses of 0·1, 0·14, 0·2 and 0·5 g. per lb. live weight.

Experiment 4. 18.12.40. Two pigs aged 9 weeks weighing 29 and 37 lb. Both were dosed individually in the food without a preceding fast. They were fed away from their companions in an unfamiliar trough. During 36 days at an average interval of 3½ days both these pigs took doses of 0·1, 0·2, 0·3, 0·4, 0·5, 0·6, 0·7, 0·8, 0·9 and 1·0 g. per lb. live weight without toxic effects. When the dose of 0·6 g. was reached both pigs refused the drugged food, but ate normal food. This dose was repeated the next day in their normal trough and was eaten. The normal trough was used for the succeeding doses. The day after the last dose these pigs had lost 6 and 4 lb. respectively, but the herd from which they had been taken was suffering from influenza and both these pigs subsequently died of pneumonia. Their loss of weight was attributed to the influenza and the bad weather conditions prevailing.

It may be noted here that most of each dose of phenothiazine given to these pigs would have been eliminated before the next dose was given. Schnitzer, Siebermann and Bett (1942) found that most of a dose of 1·5 g. of phenothiazine was eliminated during the first 48 hours after the dose by dogs, mice and guinea-pigs and that none could be detected in the urine 4-5 days after the dose.

Experiment 5. 5.1.41. Four pigs weighing 62, 54, 47 and 63 lb., aged about 15 weeks were dosed apart from their companions with drugged food in an unfamiliar trough. Green phenothiazine powder was used without a previous fast. The day after a dose of 0·5 g. per lb. the drugged food, which was greenish, was not eaten. Next day 1 lb. of molasses was mixed with the same dose in fresh food. During the next five days the drugged food was not eaten, although more molasses was mixed with it with the idea of making it more palatable.

Experiment 6. 6.3.41. Four pigs weighing 52, 57, 63 and 65 lb., aged about 20 weeks were dosed apart from their companions with green phenothiazine powder in the food in their normal trough without molasses. The day after a dose of 0·2 g. all the drugged food had been eaten without ill effects. Four days later a dose of 0·5 g. was taken, but more slowly, without ill effects. Three days later 1·0 g. was given in the same way; next day only a little had been eaten. Undrugged food was mixed with the drugged food each day until all of this dose of 0·5 g. had been taken during five days. These pigs had thus taken, in the form of a mass dose, either as much phenothiazine as that which had caused toxic effects in pigs rather more than twice as young used for Experiments 1 and 2 or up to five times as much (1·0 g. per lb.). The therapeutic dose would be nearer 0·1 g. per lb., so that mass dosing of pigs 20 weeks old would appear to be safe. It appears that their refusal of the drugged food may result in their being forced by hunger to take a series of reduced doses over a period of days.

Experiment 7. 5.5.41. Four pigs were used. No. 2562, aged 4½ months, weighed 57 lb.; No. 2557, aged 4½ months, weighed 91 lb.; No. 2555, aged 4½ months, weighed 98 lb.; No. 2561, aged 3½ months, weighed 51 lb. All were dosed individually with 1·0 g. per lb. of "Phenovis" suspension of phenothiazine with a syringe *per os*.

The next day all four pigs were lying on their sides with slight twitchings of their muscles; they could not stand when they were lifted. A sample of blood taken from No. 2562 contained no methaemoglobin. The next day all four pigs showed signs of respiratory trouble and the suspicion arose that they might have inhaled some of the phenothiazine suspension. The blood of No. 2562 taken by heart puncture was compared with the blood of a normal pig taken in the same way. Its haemoglobin determined spectroscopically was 54 per cent. of the normal, its total haematin 53 per cent. and its oxygen capacity 55 per cent. of the normal. The erythrocyte count was 5·4 millions per c.mm., which is within the normal variation of 5 to 8·2 millions given by Fraser (1938) for pigs aged 2 to 7 months. It may be noted here that this pig ultimately recovered, while the other three died. It is possible, but unlikely, that the blood of the other pigs might have shown other or more severe effects of phenothiazine. Thorning, Morrill and Boley (1942) found no changes due to the drug in the blood of pigs prostrated by phenothiazine; the writer (1940) found no effects on the blood of a horse given 500 g. of the drug by stomach tube, apart from the presence of methaemoglobin, which rapidly disappeared; Grahame, Sloane and Morris (1942) and Holman and Pattison (1942) also found no significant changes in the blood of sheep and horses treated with phenothiazine. On the other hand, other workers, quoted by Davey and Innes (1942), have reported, in animals and man, anaemia following treatment with phenothiazine, which, although it was usually temporary and easily cured by iron treatment, was followed, in one human case, by death.

On the third day after the dose pig No. 2557 died. Its organs, apart from some congestion of the lungs and liver, were normal and the cause of death was not determined. The other three pigs still showed signs of respiratory trouble. The next day pig No. 2561 died. Its liver was congested and its lungs showed broncho-pneumonia with some abscess formation and marked oedema of the interstitial tissue; there was some pleurisy and pericarditis. The remaining two pigs were now trying to walk; but on the sixth day after the dose pig No. 2555 died of broncho-pneumonia. Pig No. 2562, whose blood had been examined, recovered completely by the eighth day after the dose.

The conclusion drawn from this experiment was that three of the pigs had probably been killed by pneumonia following inhalation of the phenothiazine suspension, while there was no clear evidence that direct introduction of 1 g. per lb. of phenothiazine by a syringe had caused the illness of the fourth of the group.

Finally, an experiment was designed to find out whether phenothiazine could be given by stomach tube without risk of inhalation pneumonia and, if so, whether doses as high as 1·0 g. per lb. thus given would cause toxic effects.

Experiment 8. 10.6.42. Eleven pigs aged 8 weeks, weighing 16 to 21½ lb., were used. One control was not dosed. The other ten were dosed individually by stomach tube with 1·0 g. per lb. of phenothiazine. Two brands of phenothiazine were used, namely, Avlon Dispersible Powder, which, when it is mixed with water, gives an excellent dispersion which leaves the syringe and tube cleanly so that practically all the dose is received; and a mixture with water of the green phenothiazine powder used for Experiments 4 and 5, a mixture which adheres to the sides of the funnel and tube so that much of the dose is lost. The ten pigs were divided into five pairs. One individual of each pair received 0·1, 0·3, 0·5, 0·7 and 1·0 g. per lb. of the green powder and the corresponding individual of each pair the same doses of Avlon Dispersible Powder. The day after the dose all the pigs were lethargic. No. 7, which had resisted the passage of the stomach tube, showed a drunken gait, with marked weakness of the hind legs. The others were normal. Some of the pigs given the Avlon Dispersible Powder were passing red urine, but all those given the green powder were not, probably because they received much less of the dose. About 21 hours after the dose No. 9 was lying on its side; when it was lifted it made reeling attempts to walk, which failed because of inco-ordination and weakness of the hind legs. About 23 hours after the dose No. 7 was comatose, but recovered the next day. About a week later it died and it was found that the pharyngeal mucosa from the soft palate to the level of the first rib was undermined by ill-smelling pus. It was concluded that death had resulted from an injury made by the stomach tube and this pig was eliminated from the experiment. Meanwhile, No. 9, after a total of three days of the familiar toxic effects, recovered. Thus only one of the nine pigs that were given 1·0 g. per lb. of phenothiazine showed transient and typical toxic effects. It is, however, doubtful whether the four pigs given the green powder mixed with water actually

had the full doses, because of the difficulty of administering so unsatisfactory a mixture.

Summary

The typical signs of phenothiazine poisoning of pigs are incoordination and weakness of the hind legs, resulting in reeling gait or, in more severe cases, inability to stand, although the animal will often eat, drink or nurse if it is held to the trough or mother. There is no clear evidence that the blood is affected by doses that cause these symptoms.

The experiments recorded above do not alter the writer's earlier conclusion that, when pigs aged 12 weeks with an average weight of 35 lb. are given phenothiazine by mixing the total dose for a group of pigs with the total food for that group (mass dose), some of them may show toxic effects from doses as low as 0·2 g. per lb. live weight (Experiment 1). But pigs three weeks younger than this and about the same weight have been given individually in their food doses gradually increasing to 1·0 g. per lb. without ill effects (Experiment 4). This seems to indicate that, when the mass dose is employed, some pigs get more food and, therefore, more of the drug and suffer toxic effects.

When older and heavier pigs (Experiments 3 and 6) were given from 0·1 to 1·0 g. per lb. live weight of the drug by mass dose, no toxic effects were seen. Other workers, whose results are summarised, have obtained this result. When the higher doses were given the pigs seemed to reduce their daily doses by refusing to eat more than a portion of the drugged food each day.

When pigs as old as 4½ months, weighing 51-98 lb., were given a suspension of phenothiazine in water by the mouth with a syringe at a dose rate of 1·0 g. per lb. live weight, toxic results appeared to follow, but these, and the deaths of three out of four of these pigs, may have been due to pneumonia caused by inhalation of some of the phenothiazine suspension. In the blood of one of these pigs the haemoglobin and oxygen capacity were reduced to half the normal, although the erythrocyte count was normal. The remaining pig recovered completely.

When 1 g. per lb. live weight of phenothiazine suspension in water was given by stomach tube to pigs aged 8 weeks and weighing 16 to 21¼ lb., only one out of nine pigs showed toxic effects and these effects were transient.

It appears, therefore, that the responses of individual pigs to phenothiazine, whatever the dose and whatever the age and weight of the pigs are, like those of individual horses, cattle and human beings, erratic and incalculable.

Some of the psychological factors which may cause pigs to refuse drugged food are briefly suggested. The writer's experiments confirm the statements of Swanson, Harwood and Connelly that drugged food should be given to pigs in a trough and a pen to which they are accustomed, that there should be enough room for all the pigs to get at the drugged food, that the pigs should not vary greatly in size and that they should be hungry.

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References

Boley, L. E., Levine, N. D., Wright, W. L., & Graham, R. (1941.) *Proc. Ohio vet. med. Ass.*, 63-87. Phenothiazine in the treatment of gastro-intestinal parasites of animals.

Davey, D. G., & Innes, J. R. M. (1942.) *Vet. Bull.*, **12**, R7-R14. The present position of phenothiazine as an anthelmintic.

Fraser, A. C. (1938.) *Vet. J.*, **94**, 3-21. The blood of pigs.

Graham, T., Sloan, J. E. N., & Morris, P. G. D. (1942.) *Vet. Rec.*, **54**, 213-214. Observations on phenothiazine as an anthelmintic in horses and with reference to blood examinations.

Harwood, P. D., Jerstad, A. C., & Swanson, L. E. (1938.) *J. Parasit.*, **24**, Suppl. 16-17. The efficacy of phenothiazine for the removal of ascarids and nodular worms from swine.

Holman, H. H., & Pattison, I. H. (1941.) *Vet. Rec.*, **53**, 491-498. A study of the blood picture of lambs suffering from parasitic gastritis.

Idem. (1942.) *Ibid.*, **54**, 215-216. Observations on the blood picture of sheep treated with phenothiazine.

Innes, J. R. M., & Whittick, J. W. (1940.) *J. Path. and Bact.*, **50**, 377-381. *Thrombo-angiitis obliterans* in a horse.

Lapage, G. (1940.) *Vet. Rec.*, **52**, 648-657. Experiments on the anthelmintic action of phenothiazine.

Lekwa, C. L. (1941.) *Vet. Med.*, **36**, 448. Phenothiazine poisoning in swine.

Newcomer, E. J. (1937.) *Better Fruit.* **31**, 5. Phenothiazine, a promising new insecticide.

Rietz, J. H. (1942.) *J. Amer. vet. med. Ass.*, **100**, 360. Was phenothiazine responsible?

Roberts, F. H. S. (1941.) *Austral. vet. J.*, **17**, 130-137. Phenothiazine as an anthelmintic for horses, cattle and pigs.

Schnitzer, R. J., Siebermann, C., & Bett, H. D. (1942.) *Canad. publ. Hlth J.*, **33**, 17-24. Chemical and toxicological studies of phenothiazine.

Swanson, L. E., Harwood, P. D., & Connelly, J. W. (1940.) *J. Amer. vet. med. Ass.*, **96**, 333-338. Phenothiazine as an anthelmintic for the removal of intestinal worms from swine.

Thorning, W. M., Morrill, C. C., & Boley, L. E. (1942.) *Vet. Med.*, **37**, 120-122. Phenothiazine poisoning in pigs.

CLINICAL COMMUNICATIONS

Torsion of the Uterus in the Bovine*

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Torsion of the uterus is a condition that those engaged in cattle practice are always likely to come up against. Although not a common occurrence, several cases are often met with in rapid succession—then a long period elapses before the condition is again encountered. This is often experienced in other of the less common conditions met with, and one wonders if seasonal and climatic conditions do not also play their part in the causation of these rarer conditions.

Aetiology.—Torsion of the uterus may be attributed to any one of the following: internal injury, slips or falls, excessive maternal labour pains and exaggerated foetal movements. Of these four the last is likely to be the immediate cause. The condition has never been encountered where there has been a definite history of any external violence, or in a cow which has had pre-parturient milk fever, with its attendant nervous symptoms of inco-ordination. In any case it would seem from the following two experiences that a not very violent effort is necessary to bring about torsion or its reduction.

A case was encountered late at night, and owing to lack of assistance and accommodation it was decided to leave attempts at reduction until the morning. On arrival then the cow had calved normally—the torsion reduced without any assistance. In the other case the condition had been successfully reduced, the cow allowed to rise, when on examination torsion was again found to be present. This same phenomenon occurred a second time. On casting and reducing for the third time, ropes were fixed to the feet of the foetus before the animal was allowed to rise, which proved successful in keeping the uterus in its normal position.

Symptoms.—The condition has only been met at or near the normal time of parturition. Williams in "Diseases of the Genital Organs" mentions meeting with it as early as the 140th day of pregnancy—in this case the gravid uterus being comparatively small, one would expect spontaneous recovery. In those cases met with near calving, the animal shows a certain degree of restlessness and abdominal discomfort, labour pains are subdued or practically absent, there is no discharge at the vulva unless the case has been unduly prolonged, when a slight bloody discharge may be seen. The vulva, instead of its flaccid, relaxed state at this time, appears abnormally small, and the lips seem drawn forwards to the vagina, simulating entropion of the eyelids. On manual examination the diagnostic spiral corkscrew-like folds of the vagina can be palpated, commencing about 9 to 12 inches posterior to the cervix. The cervix, slightly opened, usually also can be palpated, and in some cases parts of the foetus may also be reached. These spiral folds, which give the impression of tense muscular bands, may completely encircle the vaginal walls, or where the torsion appears to be partial, only half the circumference of the vagina is involved. These spiral folds may either be from left to right or from right to left, probably depending upon which horn of the uterus carries the foetus. Age appears to have no relation to the condition, which has been met in heifers as well as in older cows.

Treatment.—The treatment of this condition is well epitomised in the title words of a popular war song—"Roll out the Barrel"—for it is by rolling the cow as one would a barrel that reduction is hoped to be brought about. For this purpose a good large straw yard is probably the most suitable place for carrying out the operation. Failing this a pasture may be utilised. The majority of loose boxes do not allow sufficient room for manipulation. The animal must be cast, and for this purpose Reuff's method is probably the best; the legs, being free, cause no pressure on the abdomen, as does casting where side lines are utilised. Having cast the animal, it is then rolled over by grasping the lower legs and turned on the long axis of the body. Having completed one revolution, the animal is propped up on the sternum, the outside upper hind leg flexed and tucked in as far as possible under its body; it is then pushed on its side and rolled over as before. No good purpose is served by keeping the arm in the vagina during the operation. Theoretically speaking, the rolling should be in the opposite direction to the twisted uterus—that is, if the torsion is from left to right, the animal should be rolled from right to left; in practice, however, this does not always seem to function, and it is better to make an examination after each rolling process to see if the condition has improved or not, and if not, revolve the patient in the opposite direction. Reduction may occasionally occur after one operation but in the majority of cases two or three complete

* Presented to the Eastern Counties Division, N.V.M.A., at Colchester, October 22nd, 1942.

revolutions are required to bring about reduction, and in a few cases repeated rolling appears to have no beneficial result; in at least 90 per cent. of cases, however, reduction can be obtained by the rolling operation. Having reduced the torsion, the calf can be delivered at once provided the cervix is sufficiently dilated.* In quite half the cows that have been encountered the cervix is only partially open, when the patient must be left for a few hours, and if the cow has not calved normally, little difficulty is usually found in effecting delivery.

Many other methods of treatment have been tried for this condition, but in the time allotted it is not possible to make further reference to them. Moreover, at the present time it is generally accepted that rolling gives the best results.

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Sulphonamide Therapy in Mastitis*

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Owing to the difficulty presented by the massive nature of the subject "Sulphonamide Therapy in Mastitis," I propose to confine myself to an enumeration of those types of mastitis that I recognise clinically, and as each one is mentioned, to give you what in my opinion is the scope of sulphonamide therapy in each.

Mastitis due to Str. agalactiae Infection.—First, therefore, let me deal with the commonest of all types of mastitis, that caused by the *streptococcus agalactiae*. This I recognise clinically in two forms, acute and chronic. In the acute form, sulphonamide therapy finds its greatest use, the symptoms being a sudden rise in temperature, swelling and heat in the udder, and milk reduced to a straw-like secretion. The dosage of sulphonamide P employed is an initial dose of three ounces, followed by a single ounce at eight-, six- or four-hourly intervals according to the severity of the case. The results are usually spectacular.

The chronic form is usually detected by examination of milk samples, but may be revealed clinically by a periodic observance of small flakes in the strip cup. Sulphonamide P in these cases will always effect the clearance of the milk, but relapses are frequent and it is on the irrigation of the udder with acriflavine (one in ten thousand) during the dry period that the hopes of a permanent cure must be based.

In the course of practice I have met many cases of a diffuse thickening of the skin of the udder. So far as I am aware, the condition is unnamed in England, but I have heard it referred to as "Wem" in Wales. This may be and often is accompanied by exudation of a serum-like fluid from the surface of the udder. The condition responds within a matter of hours to three ounces sulphonamide P followed by one ounce *t.i.d.*

Gangrenous Mastitis.—It has been my experience that sulphanilamide is useless in the treatment of this condition, whilst M & B 693 employed even in heavy dosage seems merely to slow down the otherwise rapid fatal course of the disease. I therefore continue to place my faith in immediate and radical use of the knife.

Summer Mastitis.—This type of mastitis, caused by *C. pyogenes*, has not responded to any form of sulphonamide therapy.

Mixed Infections.—It has been my experience that many forms of mastitis are due to a mixture of the aforementioned organisms, most commonly staphylococci and streptococci. Sulphonamide P will very often bring about an apparent cure, but in the majority of cases microscopic examination of samples will still reveal the presence of bacteria.

Summary

When treating any form of mastitis I lay great stress upon the microscopic examination of samples from the diseased cows in order that I may know, within reason, which organisms I am dealing with. This is I believe, essential in order to prevent the indiscriminate use of a drug of the sulphonamide series in all cases.

The second point is that although in the streptococcal forms of mastitis sulphonamide therapy will produce a clinical cure, the case may still be highly infective from the bacteriologist's point of view. In my practice, therefore, no case of mastitis which has responded to a sulphonamide is regarded as cured until the udder has been irrigated with acriflavine at the subsequent dry period.

All four quarters are filled to normal milking tension when the udder is completely quiescent and the solution is not removed.

At the present moment I have had no experience of use of sulphonamide E.O.S.

* Presented to the Eastern Counties Division, N.V.M.A., at Colchester, October 22nd, 1942.

Weekly Wisdom

Books should never be classified. To classify them is a science, but not to classify them is an art.—"With Love and Irony," Lin Yutang.

ABSTRACT

[THE SIZES OF VIRUSES AND THE METHODS EMPLOYED IN THEIR ESTIMATION. Markham, R., Smith, M., and Lea, D. (1942.) *Parasitology.* **34.** 315-352.]

This article is a detailed review of the present position regarding the measurement of virus particles. Indirect methods of estimating the molecular weight and size of virus particles, such as by measurement of sedimentation and diffusion rates, involve making certain assumptions, some of which may not be justified. Nevertheless, when a particular virus has been investigated by a number of indirect methods the general agreement in the results obtained is fairly good. In addition we now have in the electron microscope a direct method for measuring the sizes and shapes of virus particles which can be used to check the results obtained by more indirect methods. Such confirmation has already been obtained for the viruses of tobacco mosaic, tomato bushy stunt and vaccinia. Although we may not as yet know the exact size of any virus we now have a considerable amount of information as to the size of these three viruses at least.

Methods of Size Determination

1. *Ultra-violet light and electron microscopy.*—These are the most direct methods. Only viruses which are 100 mμ or larger can be measured by the use of ultra-violet light. The electron microscope, on the other hand, has a theoretical limit of resolution well beyond that necessary for the accurate measurement of even the smallest viruses. With present instruments, however, the limit of resolution is of the order of 5 mμ, but there is every reason to believe that further technical developments will render the method accurate for small viruses. The great advantage of the electron microscope is that it gives direct measurements of size, whereas the more indirect methods necessitate the interpretation of measurements by theoretical formulae the validity of which is sometimes questionable.

At the present time the electron microscope is especially valuable in determining the shape of virus particles. Some of the indirect methods of indicating particle size are designed primarily for spherical particles and require modification for particles which are markedly aspherical. For example, the electron microscope, in its present state of precision, shows that the ratio of length to breadth of the tomato bushy stunt virus probably does not exceed 3:2 and thus the use of equations derived for spherical particles is justified.

2. *X-ray diffraction.*—This method is only applicable to viruses in a crystalline or semi-crystalline form and has so far been successfully used only for some of the plant viruses. In a bushy stunt virus crystal or a tobacco mosaic virus gel the virus particles are arranged in a regular pattern which serves as a diffraction grating to a beam of X-rays, and from the angles of the pattern formed by X-rays of known wavelength the size of the virus particles can be estimated. The method is of limited application but its value lies in the fact that it can be used for the smallest viruses and, in fact, the accuracy of the method is greater as the virus becomes smaller.

Exposure to X-rays by this method or bombardment with electrons as carried out with the electron microscope inactivates the virus, but there is no reason to suppose that this affects the accuracy of the measurements.

3. *Sedimentation and diffusion.*—Measurement of the rate of sedimentation of virus particles in the ultracentrifuge under standard experimental conditions enables the "sedimentation constant" to be determined. Similarly, the rate of transference of virus particles across unit area under constant conditions enables the "diffusion constant" to be measured. From these constants the size of the particles of virus can be calculated, provided that the particles are not markedly aspherical, *e.g.*, if the ratio of length to breadth is not greater than 2:1. This method is thus of most value when the shape of the particles can be determined by the electron microscope or by X-ray diffraction.

4. *Filtration.*—The size of virus particles can be measured by filtration through collodion membranes of known porosity and this method necessitates the determination of the "average pore diameter" of the membrane and the size of particle which is just unable to pass through. If, however, the size of the particles of any particular virus varies, this method may give the size of the smallest component since, if this is highly infective, its presence will be detected in the material which passes the membrane. The shape of the particles must also be considered in interpreting the results obtained by this method.

5. *Radiation inactivation.*—This recent method has been used for determining the size of the crystallisable plant viruses and is only applicable to virus particles which are considered to be single molecules. Completely misleading results will be obtained if the method is used for complicated viruses which consist not merely of molecules of nucleoprotein but contain a diversity of chemical

substances. The principle of the method is the inactivation of the virus by known amounts of X-rays or radioactive radiation and calculation from the amount of radiation absorbed of the "radio-sensitive volume" of the virus. A crystalline virus is presumably a single molecular species and in such cases it can be assumed that the "radio-sensitive volume" will represent the least quantity of the virus having the characteristic properties of virus. With a large virus like that of vaccinia, on the other hand, the "radio-sensitive volume" will represent only a very small fraction of the volume of the virus particles.

6. *Miscellaneous methods.*—Viruses which can be seen under the microscope, such as vaccinia virus, can be measured by counting the number of virus particles in a known weight of purified virus.

The maximum size of virus particles can be estimated by finding the weight of the minimal infective dose of purified virus. This method has been used with some animal viruses and with *B. coli* bacteriophage.

Another method is measurement of thickness of layers of virus absorbed on to suitable substances and this method has been used for the tobacco mosaic virus. The length of the particles of this virus has been estimated from the concentration at which the virus becomes birefringent.

After giving a general review of the various methods of measuring virus particles the authors consider some of them in more detail. Commenting on microscopy with ultra-violet light, they point out that great reliance cannot be placed on measurements obtained in this way, especially when the material has been stained, and they point out that many authors have in fact failed to give conclusive evidence that the particles described were actually virus particles. Elford's method using collodion membranes is discussed and a revised basis for the calculation of the results is suggested.

The sedimentation and diffusion methods are subjected to a critical analysis with special reference to the calculations involved. This part of the paper is of a specialised nature and those interested should consult the original.

Three tables are provided in which are given the data on the sizes of animal and plant viruses and bacteriophages. There is also a detailed discussion of the considerable amount of information now available in the case of the viruses of vaccinia, tomato bushy stunt and tobacco mosaic. From a variety of methods, including direct measurements by the electron microscope, the sizes of these viruses are probably as follows:—

Vaccinia virus:—
Hydrated particle 235 mμ.
Unhydrated particle 200 mμ.

Tomato bushy stunt virus:—
Average diameter 29·2 mμ.
Axial ratio not exceeding 1·2 (unhydrated virus).

Tobacco mosaic virus:—
280 × 15·2 mμ (unhydrated).

In this summary only some of the more general features of the article have been referred to and the specialist should consult the original for further details. There is a bibliography of nearly 200 references.

E. G. W.

NATIONAL HORSE ASSOCIATION

Frances Lady Daresbury, presiding at a Council meeting of the National Horse Association, stated that the great demand for horses and ponies had brought with it a big rise in price, and dealers and buyers had been searching the country for fit young horses. There was every indication that ponies and traps will command high prices for some time.

Thirty-five candidates were elected to the membership, and the following were selected to form the War Executive Committee: Frances Lady Daresbury, Sir Walter Gilbey, Bt., Mr. Nigel C. Colman, M.P., Brig. W. H. Anderson, Major H. Faudel-Phillips, Mr. Claud F. Goddard, Mr. R. S. Summerhays and Major-General Geoffrey White.

In recent months there had been such a demand for Major-General Geoffrey White's booklet "Single and Pair Horse Driving," that a reprint was authorised, and the Council further noted that a book on driving by Major H. Faudel-Phillips would be available shortly. Owing to recent demands one or two leaflets would have to be reprinted, and the Council regretted that in view of its popularity the News Sheet to members would have to be again curtailed in size, owing to paper restrictions.

The Secretary was instructed to collect material for a pamphlet dealing with each breed of horse or pony. This should be of considerable interest and of great use when the war ceased, and there was a general demand for horses for export, but it could only be issued when paper was available. In the meantime each Breed Society was to be asked to contribute material for such a booklet.

IN PARLIAMENT

Tuberculosis (Agricultural Research Grants)

Mr. David Adams asked the Lord President of the Council whether he is aware that of the grants for research paid by the Agricultural Research Council in the year ended March 31st, 1942, totalling about £30,000, the smallest item was for tuberculosis, amounting to £2 5s. 10d. only; and whether, as the milk produced by many farms is prolific in this disease, he will ensure that greater research into this question is carried out?

The Lord President of the Council (Sir John Anderson): The sum of £2 5s. 10d. referred to by the hon. Member represents only an item of direct expenditure by the Agricultural Research Council for the purchase of a small piece of apparatus. Grants amounting to a total sum of £1,390 were made by the Agricultural Research Council for work on tuberculosis at the Institute of Animal Pathology, Cambridge, and a much larger sum was expended during the year in question on such research both at the Veterinary Laboratory of the Ministry of Agriculture and Fisheries, and at other agricultural research institutes, receiving block maintenance grants borne on the Votes of the Agricultural Departments. I can assure the hon. Member the research on tuberculosis in cattle is being pursued most actively at a number of centres in Great Britain under the co-ordination of the Agricultural Research Council, whose estimated expenditure in the current financial year for this purpose is £6,375. This sum also is additional to general maintenance grants.

Mr. Adams: In view of the increase of this disease in the country, is the right hon. Gentleman satisfied that this expenditure on research into this disease is sufficient?

Sir J. Anderson: Yes, I believe so and I can assure the hon. Gentleman that no financial obstacle exists in the way of the fullest possible investigation.

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Post-war University Education

Mr. Henderson Stewart asked the Chancellor of the Exchequer whether, in the course of the present review of the educational systems of England, Wales and Scotland, it is intended to enquire into the position of the universities and the educational services which they render; and what was the date and character of the last enquiry into university education.

Sir K. Wood: In planning the development of education after the war the question of access to the universities for students likely to profit by a university course is receiving attention. The universities will be closely associated with the plans for the further education of demobilised persons announced by my right hon. Friend the Minister of Labour and National Service on March 25th. It is not, however, proposed that there should be any formal enquiry, such as a Royal Commission, into the universities. The last Royal Commission on university affairs was that of 1935 on the University of Durham.

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Agriculture (Insectivorous Birds)

Colonel Carver asked the Minister of Agriculture whether, as a result of the mild winter and early spring, there has been any increase in insect pests; and if so, whether moderation will be observed in the destruction of birds?

Mr. Hudson: I have no reason to suppose that the mild winter and early spring will cause any general increase in the number of injurious insects, since a mild winter favours some kinds of insects but is unfavourable to others. I strongly deprecate the destruction of mainly insectivorous birds.

The Dartmoor Pony Society report that though unfortunately there are now only a few ponies left on the moors, and the majority of the larger type have been disposed of for driving purposes, the breeding of the pure native Dartmoor pony is being carried on, and all the leading breeders still retain the nucleus of their studs.—*N.H.A. News Sheet.*

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Asked by Major Neven Spence in the House of Commons recently why he refused to confirm a regulation made by the County Council of Orkney under the Foot-and-Mouth Disease Order, Mr. R. S. Hudson, Minister of Agriculture, stated: "I refused to confirm the regulation in question because I was satisfied that the control measures exercised by my Department were adequate to meet the situation."

NOTES AND NEWS

The Editor will be glad to receive items of professional interest for inclusion in these columns.

Diary of Events

April 28th.—Annual General Meeting of the Western Counties Division, N.V.M.A., at Exeter, 2 p.m.

April 29th.—N.V.M.A. Joint Veterinary Officers and Public Health and Parliamentary Committee, 36, Gordon Square, W.C.1, 11.30 a.m.

April 29th.—Meeting of the Midland Counties Division, N.V.M.A., at Birmingham, 2.30 p.m.

April 30th.—**N.V.M.A. Council Meeting,** Connaught Rooms, Great Queen Street, W.C.2, 11.30 a.m.

April 30th.—Meeting of the Royal Counties Division, N.V.M.A., at the National Institute for Dairying Research, Shinfield, nr. Reading, 2 p.m.

April 30th.—Meeting of the Yorkshire Division, N.V.M.A., at Leeds, 2.30 p.m.

May 6th.—Meeting of the Central Veterinary Society, Conway Hall, Red Lion Square, W.C.1, 2.30 p.m.

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Paper Control and Space Limitation

Again we would draw the attention of contributors to every section of *The Veterinary Record* to the announcement made in our Notices column by the Editorial Committee requesting them not to exceed a specified number of words. This restriction is intimated with regret, but is necessitated as a war-time measure in view of the paper supply situation.

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Protective Clothing for Veterinary Surgeons

The Farm Livestock Emergency Service has recently approached the Ministry of Home Security on the matter of the adequate provision for veterinary surgeons and their helpers of anti-gas protective clothing, without which it is impossible to deal with contaminated livestock. F.L.E.S. has been advised that a notice has now been issued to local authorities by the Ministry empowering them "to lend protective clothing (anti-gas suits, gloves and gum boots) to such extent as may be found desirable, and the situation permits, to veterinary surgeons and their helpers in the Farm Livetock Emergency Service, who will then be prepared to deal with the animals. The loan should be *ad hoc* only: no authority is given for the issue of protective clothing to the Service or its helpers."

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Access to Coastal Areas

In connection with the recent announcement of prohibition of access to the ten mile restricted area in certain coastal districts—an emergency measure to come into force as and when required—an enquiry has been made as to the position of veterinary surgeons engaged in the work of the Farm Livestock Emergency Service and N.A.R.P.A.C., and of those whose practice takes them within the areas concerned. We are advised that this is a matter for arrangement with the local military authorities and that permission to enter has to be obtained from the G.O.C. commanding the area the applicant desires to enter. If this procedure be followed veterinary surgeons should find no difficulty in obtaining the necessary permits.

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The Association and the N.G.R.C.

A meeting took place at 39, Jermyn Street, London, S.W.1, on Friday, April 16th, between representatives of the N.V.M.A. and the Stewards of the National Greyhound Racing Club, when recommendations were presented on behalf of the Association for assisting members of the profession holding appointments at greyhound racecourses in the carrying out of their duties and for strengthening the arrangements for the detection and suppression of malpractices. The Association's representatives were the President (Dr. W. R. Wooldridge), Prof. J. McCunn, Mr. G. P. Male, Mr. E. Brayley Reynolds and Mr. Arnold Spicer. Lord Denham was in the chair and Mr. J. K. Bateman and Mr. R. A. Willett, Hon. Consultant Veterinary Surgeons to the Club, were also present.

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R.C.V.S. OBITUARY

Weir, George Wallace, J.P., Capt. late R.A.V.C. (T.F.), Professor of Materia Medica in the Glasgow Veterinary College of 131, Shawmoss Road, Pollokshields, Glasgow. Graduated Glasgow, May 22nd, 1902. Died April 9th, 1943; aged 65 years.

A biographical tribute to the late Professor Weir will appear in our next issue.

Mr. Peter Braid, M.R.C.V.S.

Concerning the death of Mr. Peter Braid, M.R.C.V.S., recorded with much regret in our issue of last week, Mr. S. G. Abbott, of the Glasgow Corporation Veterinary Department, writes: "On Friday, April 2nd, Mr. P. Braid, M.R.C.V.S., succumbed to a sudden seizure while on his way to business. It came as a great shock to those who were in intimate contact with him, as he had always appeared to be of robust vitality. Indeed he had just entered his fortieth year of service with the Glasgow Corporation and during all that time, except when away on military duties, he had never been absent for a single day on account of illness.

"Mr. Braid qualified at Edinburgh in 1901 and after a period of assistantships to veterinary surgeons in the County of Durham became assistant to the late Mr. J. McKinna, F.R.C.V.S., of Huddersfield, with whom he remained for a period of two years. In 1904 he was appointed as a Veterinary Inspector to the Glasgow Corporation and he served in that capacity throughout the rest of his life. During the last war he attained the rank of Captain in the R.A.V.C. and saw active service both in France and Italy.

"He was a man, by nature, of reserved disposition, but those who had the good fortune to be among his associates knew him as a man of impeccable honour, of high and upright character and one who was a staunch and loyal friend."

The Funeral

The funeral took place on Monday, April 5th, and the service was conducted by the Rev. Neville Davidson, C.F., Minister of Glasgow Cathedral, of which Mr. Braid was a regular attender. Among the mourners the veterinary profession was represented by Mr. A. Thomson, representing the West of Scotland N.V.M.A., Mr. N. Nicolson and Mr. T. Johnston, of the Ministry of Agriculture, and Mr. MacLeod and Mr. Abbott, of the Corporation of Glasgow. There were also present Mr. Rennie, the Corporation Markets Superintendent, the staff of the Veterinary Department and a large number of members of the meat trade in Glasgow.

We extend our deepest sympathy to Mrs. Braid and to Miss Braid, who is now in her final year of medicine at the University of Edinburgh.

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PERSONAL

Birth.—Pook.—On March 12th, at Edinburgh, to Lily, wife of H. L. Pook, M.R.C.V.S., of 49, Endless Street, Salisbury, a son, David Lucas.

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Stirling Veterinarian's Appointment.—Mr. A. Sillars, Stirling County Veterinary Inspector, is to be seconded for meat inspection work with the Ministry of Food for the duration of the war. In this connection *The Scottish Farmer* observes: "As local authority duties in connection with meat inspection became more and more restricted in consequence of the closing of private slaughterhouses and the taking over of public abattoirs, Mr. Sillars devoted an increasing amount of his time to 'missionary' work for the clean milk campaign. He did much to improve relations between dairy farmers and the Public Health department by his tactful handling of the subject, and his demonstrations were popular and successful. Mr. Sillars also carried out the bulk testing of milk samples for tubercle bacilli and was associated with the West of Scotland Agricultural College in the mastitis investigations. His services were warmly praised at a meeting of the Public Health Committee of Stirling County Council and he was assured that he would be welcomed back to his Stirlingshire post at the end of the war. There would then be a tremendous field for Mr. Sillars' activities in the county., said the Chairman, Captain C. A. Salvesen, Polmont."

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VETERINARY AID FOR TREATMENT OF DISEASES OF DAIRY CATTLE

In a recent announcement the Ministry of Agriculture states that it "wishes once again to draw the attention of farmers, particularly dairy farmers, to the importance of seeking veterinary aid for the treatment and control of disease in their herds," and continues, "Even if a farmer is not prepared for one reason or another to accept the Dairy Cattle Diseases Control Scheme, with its comprehensive facilities for the control of contagious abortion, sterility, mastitis and Johne's disease, he should nevertheless take full advantage of the services of his veterinary surgeon.

"Certain lines of treatment have been adopted for the Control Scheme as being the most effective according to our present knowledge. There is no definite evidence that other methods are of value for general application, although certain specialised treatments for particular individual cases may yield good results. The fact that a method of treatment has been recommended under the Scheme does not mean, however, that a farmer should attempt to apply it without seeking the advice of his veterinary surgeon. He

should not, for instance, himself apply infusion or irrigation treatment of the udder in cases of mastitis; this is a method of treatment requiring skill and care in its application, which otherwise may produce serious effects and may even result in complete loss of a quarter of the udder. Still less should treatments not generally recommended for the Control Scheme be practised by farmers without the advice of a veterinary surgeon. For example, he would be well advised to refrain from using vaccines for mastitis; generally speaking there is no evidence that they are of any practical value. Nor should he in any circumstances adopt, without veterinary advice, hormone treatment for infertility etc., in cattle. Such treatment may be of value in skilled hands for certain cases, but work on this method of treatment is still in the experimental stage. At the first sign of trouble in his dairy herd the farmer should call in his veterinary surgeon. The results of wrong treatment may be just as serious as no treatment at all."

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ROYAL ARMY VETERINARY CORPS

The following announcements are made in the issue of *The London Gazette* dated April 6th, 1943:—

Lieut. R. H. Duff (63358), h.p. list, late R.A.V.C., retires on ret. pay on account of ill-health, December 1st, 1942.

The undermentioned to be Lts.: Reginald Harold Kenneth Davis (263210), February 18th, 1943; Michael John O'Reilly (263508), March 3rd, 1943; Thomas Stewart (263887), March 5th, 1943, and George Pfaff, B.Sc. (244829), to be Lt., January 15th, 1943.

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NUTRITION IN PREGNANCY

The tenth scientific meeting (sixth of the English group) of the Nutrition Society was held on Saturday, February 6th, 1943, at the London School of Hygiene and Tropical Medicine, and took the form of a whole-day conference on "Nutrition in Pregnancy." The chair at the morning session was taken by Dr. F. H. A. Marshall, F.R.S., and that at the afternoon session by Professor (now Brigadier) F. A. E. Crew, F.R.S., and all the discussions were of either direct or comparative interest to the considerable number of veterinarians who attended. The contributions are to be published, in due course, in *The Proceedings of the Nutrition Society*, but for the benefit of veterinary readers an account is given here by permission of the officers of the Society.

The various papers were as follows:—

(1) Foetal Development

Mr. Aleck Bourne, M.A., M.B., F.R.C.S.: Of the many factors which contribute to the ideal normal results of reproduction for both mother and child, we know that food which embodies an adequate supply of all the nutrients is the most important. Trials have shown that marked improvement in maternal, stillbirth, and neonatal death rates, results from the provision of extra food and care. There is evidence that nutrition of the mother is important, not only for the development of birth-vigour in the child, but also because of its influence on uterine action during labour. The risk to the child is greatly increased when uterine action is feeble. While some cases of neonatal death, *i.e.*, death during the first month of life, are due to neglect and to errors of feeding, more are due to lack of what may be termed "vigour" at birth (*e.g.*, in 1938, the rate amongst illegitimate babies during the first four weeks of life was 41·74 per 1,000 as opposed to 27·69 per 1,000 amongst legitimate babies). Infant morbidity and failure to develop the optimum health of childhood and adolescence are largely attributable to faults in the nutrition of the mother during pregnancy.

Among the factors which influence birth weight are heredity, the degree of placental sufficiency, the nutrition of the mother, the number of the pregnancy and diabetes. In stock breeding it has been shown that the size of the mother is the chief determining factor in the size of the young, and clinical experience supports the extension of this observation to man. Relative placental insufficiency can be due to destruction of placental tissue by necrosis (infarction), resulting in separation of an area of placenta, or possibly to a placenta abnormally small for the foetus it has to carry. The majority of necrotic cases are associated with albuminuric toxaemia. The nutrition of the mother is acknowledged to have an important influence on birth weight, but only when on an unusually low plane. It may be that nutrition acts most forcibly in those species which have the longest gestation, *i.e.*, those in which the influence of dietary depletion has the longest time to act. It has been stated that there may be a deficiency of vitamin B in eclampsia and pregnancy toxaemia, Nixon and Wright having found a marked reduction in urinary excretion and in placenta content of the vitamin in these conditions.

Protein deficiency during the last quarter of pregnancy is probably a factor governing birth weight and birth vigour. Hammond has stated that diet during the latter part of pregnancy influences the birth weight of lambs, summer lambs being heavier than spring lambs. Emphasis must, however, be laid upon birth vigour, and it is probable that in man deficiencies of protein, iron, calcium, phosphorus, vitamins and even trace elements in the mother's diet have a greater influence on post-natal vigour than on birth weight. Birth weight tends to increase in successive pregnancies, but this fact is of no obstetric importance unless the pelvis is small enough to have lost its spatial "reserve." The babies of diabetics are usually very large, especially if the sugar metabolism is uncontrolled by insulin; this is probably due to nothing more than a high carbohydrate availability.

There is abundant evidence that, in animals, a high birth weight is associated with new-born vigour and also of optimum development during the formative age after birth. [The remainder of Mr. Bourne's paper was essentially of medical interest.]

Discussion.—Dr. A. S. Parkes, F.R.S. (in a contribution read by his wife) referred to experiments on the effect of anterior pituitary hormones in laboratory animals. Excessive dosage resulted in superfoecundation, and in the rabbit over 30 embryos may result in animals which conceive while under such treatment. Very few, if any, of this large number ever come to term. Dr. A. Moncrieff discussed the measure, which is widely recommended in some quarters, of restricting the protein of the maternal diet so as to reduce the size of the child, and Professor E. M. Killick asked whether the loss of weight in the first few days after birth was physiological. Mr. Bourne replied that there was no evidence that reduction in maternal protein intake affected the weight of the foetus, but on the other hand it was quite likely to reduce the efficiency of uterine functions during labour. The initial loss of weight of new-born infants might possibly be obviated if care were taken to prevent heat loss and to begin feeding at once, but there did not appear to be any advantage in adopting such procedures.

(2) Physiological Factors Affecting Birth Weight

Dr. John Hammond, F.R.S., began by putting forward a theory, and later attempted to show how far the known facts supported it. He suggested that the distribution or partition of the nutrients in the maternal bloodstream between foetus and maternal tissues was determined by the same factor, *viz.*, the metabolic rate of the tissue concerned, as that governing partition of incoming nutrients between the different maternal tissues. There was experimental work on pigs and sheep to indicate that the tissue or parts with the highest metabolic rate take precedence over those with a lower metabolic rate: thus brain and C.N.S. take precedence over bone, bone over muscle, and muscle over fat. When the plane of nutrition is low, the tissues with the lowest metabolic rate suffer most, and even when nutrient material is being withdrawn from fat, the more active tissues are still able to grow, although at a reduced rate. At the onset of pregnancy the foetus comes into the picture, with an initially very high metabolic rate, and competes with the maternal tissues on a level—so far as Dr. Hammond could judge—slightly below that of the C.N.S. As the foetus grows up, however, it seems likely that its metabolic level as a whole falls, but competition between the foetus and certain other maternal tissues remains high enough for a depletion of the maternal diet to affect many of the maternal tissues before affecting the foetus.

Turning to some of the facts concerning foetal growth and birth weights, Dr. Hammond pointed out that in reciprocal crosses between large and small breeds—such as the Shire horse and the Shetland pony—the size of the offspring and weight of the placenta is directly proportional to the size of the mother and not just intermediate between the sizes of the parent breeds. It is possible that the limitation of the cross-bred foetus in the small mother is due to a higher rate of metabolism of the maternal tissues in the small breed than in the large breed, *i.e.*, by greater competition with maternal tissues, but an alternative explanation may be that special growth substances of maternal origin may be involved. Limitation of birth weight is also seen in species in which the number of young at birth may vary. In sheep, single lambs are on the average 28 per cent. heavier than individual twin lambs. (The ratio between single and twin weights increases while milk is the sole source of nutrition, but narrows as soon as the lamb is able to eat for itself.) In rabbits, in which it is possible to control the number of young at a birth by timing the mating in relation to the time of ovulation, does which normally produce eight to eleven young give individual young averaging 45 g., while if made to produce litters of one or two young only they will give young weighing 95 g. or more. By giving a mother bearing a large litter unlimited food during pregnancy, it is not possible to increase the weight of the individual young to this extent.

Another factor influencing birth weight is the age of the mother. The average weight of twin Suffolk lambs from young ewes is 11 lb., as compared with 12 lb. from adult ewes, while in the Southdown breed the average weight is 5·3 lb. for young, as compared with 6·6 lb. for adult ewes.

When considering the effect of feeding during pregnancy on the growth and birth weights of the young it is necessary to take into account the distribution of nutrients between the different components of the pregnant uterus. In the rabbit up to the middle of pregnancy the growth of the maternal and foetal placenta far exceeds that of the foetus itself, while in the later stages the increase in weight of the foetus itself far exceeds that of all other components combined. The placenta supplies the nutrients to the foetus and on the development of the placenta depends the growth of the foetus. At an early stage of pregnancy (16th day) in the rabbit there is little or no correlation between the weight of the foetal placenta and the foetus itself, but there is strong correlation in weight by the 32nd day. In sheep, also, the foetal placenta gives a very good indication of the strength and vitality of the lamb after birth. Several investigators have shown that the plane of nutrition of the ewe during the latter part of pregnancy has a marked effect on the birth weight of the lambs. From these experiments it is now becoming evident that there is a graded effect according to the level of nutrition during this period. With the body of the pregnant ewe gaining about 1 lb. during the last 60 days of pregnancy the single lambs born are no smaller than those of pregnant ewes so fed as to gain 39 lb. during this period, *i.e.*, a single foetus can draw on the mother's own tissues to supply its needs. With twin lambs this is not so, however, and under these conditions while the higher plane ewes produce lambs weighing 9 lb. the low plane ewes give lambs weighing only 6 lb.

While it may be argued that birth weight as such is unimportant in that it can be made up later, there is a relation between weight and development, and the viability of the new-born is much affected by the stage of development reached at birth. In rabbits of the same litter, the larger ones are in a more advanced stage of development at birth than are the smaller ones, having a higher proportion of body to head, better developed hair, and more advanced ossification. The development of physiological functions also is affected by birth weight, and those which develop late in life (*e.g.*, the regulation of body temperature) are very important to the viability of the young after birth. Neglect of proper feeding of the mother during the latter part of pregnancy results in loss of many thousands of lambs and probably of the young of other species each year. [Dr. Hammond referred also to the work of Snook and his colleagues (*J. Physiol.*, 1939, **97**, 120) on "twin-lamb disease" and stated that he himself had seen a similar case in a cow on a sub-maintenance ration.]

Dr. Hammond concluded by pointing out that the late developing parts of the foetus were less able to compete with the maternal tissues than the early developing parts, especially when the mother is not fully grown herself. Differences in detail were to be expected between different species in their reaction to nutrition during pregnancy, owing to differences in the stage of development at birth; the foal is at a comparatively advanced state while the new-born rat is relatively immature.

Discussion.—Professor F. G. Young spoke of the gap existing between clinical data and those of the experimentalist. In field trials the supplementary feeding of pregnant women with vitamins and minerals had not influenced birth weight but had decreased the number of stillbirths and had lowered the incidence of pregnancy toxaemia. In mice in which the young are removed a week before birth the weight of the mother continues to increase normally until the placentas are expelled. Professor O. Kestner said that the heat regulation of puppies or kittens was inferior in litters of four or five to that in litters of one or two. Sir Joseph Barcroft, F.R.S., criticised some of Dr. Hammond's deductions about the uptake of nutrients from the blood stream, and said that the only reliable method which we possessed to-day of determining the metabolic rate of tissues was the tissue slice technique. In reply, Dr. Hammond suggested that the increase in weight of mice after removal of their young might be due to placental hormones. The plane of the nutrition of the mother affected the ease of labour less by its effects on the foetus than by the proper anatomical development and efficient functioning of the uterus. The size of the foals from Shetland mares crossed with large stallions was affected by the genetic constitution of the parents, but this did not appear to show itself until after weaning.

(3) Nutritional Functions of the Placenta

Sir Joseph Barcroft, F.R.S.: It may be questioned whether the placenta has any functions in the active sense, or whether it is merely an ultra-filter; if the latter, then the only role which it can play is the blocking of this or that material which might be injurious to the foetus, since everything necessary for development gets through. Although much is said about placental efficiency in different species, all placentas appear to be equally "efficient" judging by the resulting foetuses. The sheep produces a foetus at a higher state of development than and as large as that of man, and does so in a shorter time. The horse yields to none in the efficiency of its offspring at birth. Sir Joseph said he would have liked to have been able to tell (i) what role the placenta played with regard to each important material which passed across it; (ii) how these roles could be, and were, upset; and (iii) what troubles would supervene in the case of such impairments, but it was unfortunately impossible to do this in the light of current knowledge. The function of most of the chemical constituents of the placenta was unknown. The placenta was a most formidable barrier, as had been shown by experiments with heavy sodium. In the case of oxygen, for every mm. difference in pressure between maternal and foetal blood, about 0·1 ml. of O_2 passed from one to the other in the sheep.

The devices for rendering the placenta as efficient as possible were: (i) the mere increase in barrier surface which is accomplished by making the contact between maternal and foetal epithelia wavy, or by actual foetal villi; (ii) the distribution of the foetal capillaries as a network over the actual surface of the villi (sheep); (iii) the opposite direction of flow of foetal and maternal blood in the respective capillaries (sheep, rabbit); (iv) the reduction in the number of layers of material constituting the barrier; six in the horse and pig, five in places in the sheep, four in the dog and cat, three in man and one in the rat.

Sir Joseph next discussed the physio-chemical factors involved in the transfer of substances across the placental barrier, and dealt with oxygen, sugar, water and various minerals. [Those interested will be able to read a full account in the *Proceedings*.] He concluded by suggesting that the factor limiting the size of the foetus was the size of the placenta, and more particularly the vascular bed of the latter. The relatively higher placental weight in twin, as opposed to single, lambs was obvious probably by the 80th and certainly by the 120th day.

Discussion.—Dr. T. Moore said that in rats placental transfer of vitamin A to the foetus was limited, the high vitamin A content of the colostrum compensating for this. Vitamins A and E both affect the placenta. Dr. J. Hoch said that the vitamin A, but not the carotene, contents of maternal and foetal blood were parallel. Professor Hamilton discussed structural variations in the placentas of different species, and other speakers referred to the importance of the colostrum in providing substances not transferred *via* the placenta. In reply, Sir Joseph said that differences in placental structure were quite unrelated to the stage of development reached by the young at birth.

(4) Diet of the Pregnant Woman, (*a*) Professor St. G. Hugget and (*b*) Dr. Margaret Balfour, and (5) Stillbirth and Neonatal Mortality (Mr. R. M. Titmuss) were essentially of a medical nature and although they were of considerable comparative interest to veterinarians, space does not permit of their discussion here.

In the general discussion which concluded the conference, Dr. F. Bergel and others mentioned the possibility that vitamin E deficiency might play a role in the creatinaria of pregnancy, as it has been suggested that it does in muscular dystrophy. Dr. Moore pointed out that by the time vitamin E deficiency in rats had led to clinical symptoms of muscular dystrophy, vitamin E therapy was no longer of any avail. Response to vitamin E, therefore, might have no bearing upon the aetiology of such cases. Brigadier F. A. E. Crew mentioned an aborted twin calf which had had a normal spine and hair, imperfect bone, and had consisted otherwise of an unorganised mass. He mentioned also the persistently higher rate of mortality among males as from the moment of conception: this was so marked that maleness might almost be considered as a disease.

A. N. W.

* * * * *

MINISTRY OF AGRICULTURE NEWS SERVICE

High Milk Yields from War-time Herds.—The average production of milk under war-time conditions is under 500 gallons per cow per year. There are, however, examples of remarkable yields even under the present difficult conditions. Mr. C. E. Harvey, of Aldwinckle, Kettering, had an average yield of 1,145 gallons from 175 cows in the milk recording year 1941-42. Each cow was fed according to her capacity to produce milk and the rationed concentrates were supplementary to a cowshed winter "menu" consisting of kale, sugar-beet tops and pulp, mangolds, hay, oat straw and silage.

* * * * *

Good Seeds for More Milk.—Strain and pedigree are common to good seeds and good cattle. When buying herbage seeds

farmers should realise that they can ensure getting certified stock of any special strain by asking for its certificate number. This is a guarantee that the seed has been taken from a crop selected as suitable for the production of seed of a specified type.

"True to strain" schemes are available for several types of seed. The Welsh Plant Breeding Station carry out inspections of crops grown from stock seed of strains of clovers and grasses bred by the station. Among these strains are White Clover S.100, Late Flowering Red Clover S.123 and leafy strains of ryegrass and cocksfoot. The N.F.U. and Ministry of Agriculture have a scheme for the registration and certification of fields for the production of wild white clover. Schemes are also in existence for the inspection and certification of crops of sainfoin and red clover in Hampshire, Cambridgeshire, the Cotswolds. These have been organised by the county Seed Growers' Associations in conjunction with the county W.A.E.C. and the Seed Production Committee. Particulars of any of these can be obtained from the Seed Production Committee, N.I.A.B., Huntingdon Road, Cambridge.

Good seeds smother weeds. They give longer grazing, higher food value and, therefore—more milk.

. . . . .

Bloom on Calves Fed with National Calf Starter.—Lincolnshire farmers recently had the opportunity of viewing the system of calf-rearing adopted by Mr. J. G. Henson, Bleak House Farm, Caythorpe Heath. Calves of all ages and all reared on a limited amount of milk, were in excellent condition, with a healthy bloom. This condition is attributed to careful management and making full use of National Calf Starter and National calf meal.

Mr. Henson makes good use of beet tops, beet pulp, barley straw and a limited quantity of oats for his cattle and contends that cattle are an essential link in his farming system, for the purpose of treading down straw and making farmyard manure.

Follow Instructions.—Investigations into complaints that calves failed to make good progress when fed on calf-rearing mixtures have proved that in no case was National Calf Starter being used. The unsatisfactory results were due to the use of mixtures unsuitable for the age of the calves and to incorrect feeding due to lack of proper instructions being issued by the makers of the meals concerned. Calf rearers are strongly advised to buy only those products that are known to be suitable as milk substitutes, among which National Calf Starter can confidently be recommended. To get the best results, it is highly important that the instructions issued with these foods should be strictly adhered to.

Further information on calf rearing is contained in Growmore leaflet No. 66, a free copy of which can be obtained from the Ministry of Agriculture, Hotel Lindum, St. Annes-on-Sea, Lancashire.

. . . . .

Request to Dog Owners.—Lambing has begun on lowland farms. It will continue until the end of April. In this period some nine million lambs will be born. At this season it is especially important that sheep should not be worried by dogs.

All dog owners must keep their dogs under proper control in the countryside. It is a legal obligation at any time. In war-time, when our very existence depends on the output of our farms, it is a moral and national obligation.

Every male lamb brought to maturity represents 40 lb. of mutton within the next 12 months—one person's meat ration for the greater part of the year. If there is any doubt about the dog's obedience—use the lead and don't risk food sabotage.

CORRESPONDENCE

Letters to the Editor should reach the Office not later than by the first post on Monday morning for insertion in following Saturday's issue.

The views expressed in letters addressed to the Editor represent the personal views of the writer only and must not be taken as expressing the opinion or having received the approval of the N.V.M.A.

* * * * *

FEEDING OF CACAO WASTE

Sir,—Neither Blakemore and Shearer nor Black and Barron in their instructive and timely report on the feeding of cacao waste, published in *The Veterinary Record* to-day, make reference to the work of Mueller, Wm. S., 1942, *J. Dairy Sci.*, XXV, 3, 221; "The Significance of Tannic Substances and Theobromine in Chocolate Milk." This author found that a ration containing 0·27 per cent. of pure theobromine was non-toxic to rats and that one containing 2 per cent. of pure crystalline tannic acid was. He also found that cocoa powder containing 12·15 per cent. of tannic substances was more toxic to rats than one containing only 2·67 per cent., when the two cocoa powders had approximately the same theobromine and caffeine content.

The work suggests that it may not be altogether advisable to base one's opinion of the possible toxicity of cocoa bean products entirely upon their theobromine content.

Yours faithfully,
GRAHAME WILLIAMSON.

Royal (Dick) Veterinary College,
Edinburgh.
April 10th, 1943.

* * * * *

VETERINARY SURGEONS ACTS (AMENDMENT) BILL

Sir,—With regard to the proposed new Veterinary Bill and the many excellent letters of criticism which have appeared in *The Veterinary Record*, we heartily agree with Mr. Edward Morgan that, in a matter of such vital importance, an opportunity should be given to every single member of the profession to *vote* on the question before any further steps are taken.

It has been suggested that it should be thoroughly discussed at branch meetings of the N.V.M.A., and, while agreeing with this, we would like to point out that most of us are often unable to attend these meetings and we feel that the conclusions reached may not voice the opinion of the majority of the profession.

Yours faithfully,
K. M. SMITH,
T. J. PATTERSON,
H. WILLIAMS SMITH.

Renwick House,
Shepton Mallet,
Somerset.
April 5th, 1943.

DISEASES OF ANIMALS ACTS, 1894 TO 1937, AND AGRICULTURE ACT, 1937 (PART IV).

Summary of Returns of Confirmed Outbreaks of Scheduled (Notifiable) Diseases

Period	Anthrax	Foot-and-mouth	Parasitic Mange*	Sheep Scab	Swine Fever
March 16th to 31st, 1943 ...	15	—	1	11	36
Corresponding period in—					
1942 ...	14	—	10	4	23
1941 ...	24	61	1	13	48
1940 ...	31	1	2	9	131
Total Jan. 1st to Mar. 31, 1943	91	10	4	85	139
Corresponding period in—					
1942 ...	81	11	23	91	110
1941 ...	136	176	6	92	554
1940 ...	160	15	10	91	920

NOTE.—The figures for the current year are approximate only.

* Excluding outbreaks in Army Horses.

Tuberculosis (Attested Herds) Schemes

The number of Attested Herds, *i.e.*, herds officially certified as free from Tuberculosis as at March 31st, 1943, was as follows:—

ENGLAND	WALES	SCOTLAND	TOTAL (GREAT BRITAIN)
3,895	8,797	3,414	16,106

Mr. E. Keith Robinson, Secretary of Our Dumb Friends' League, has asked Lord Woolton to put horseflesh upon the ration. He says: "This is the only way to save sufficient to keep our cats and dogs alive. Now people are getting their 1s. 2d. worth of meat a week and as much horseflesh as they want, they are stealing their dogs' dinners."—*Meat Trades Journal.*

* * * * *

The importance of people in country districts keeping all dogs under control during the lambing season is emphasised by the Ministry of Agriculture. It is, they state, a legal obligation at any time, and just now is a strong moral and national obligation.

NOTICES

IMPORTANT NOTICE TO CONTRIBUTORS

The Editorial Committee, faced with yet more stringent Paper Control restrictions, regrets that it is compelled to request contributors—and, where applicable, Secretaries of Divisions—to conform to the space limitations specified below:—

	Words
General Articles	4,000
Reports of Discussions on Papers Presented to Divisional Meetings	1,000
Reports of Special Discussions at Divisional Meetings (*e.g.*, on The Veterinary Surgeons Acts (Amendment) Bill) ...	2,000
Clinical Communications ...	1,000
Annotations	1,000
Abstracts	350
Correspondence	350

IT must be understood that the acceptance by the National Veterinary Medical Association of an advertisement for either the professional or commercial ("display") section does not imply a recommendation and that no responsibility is accepted with regard to the accuracy of any claims made or other statements therein contained.

Western Counties Division, N.V.M.A.

THE 59th Annual General Meeting of the Division will be held at the Guildhall, Exeter, on Wednesday, April 28th, at 2 p.m.

AGENDA

Routine; Election of officers for ensuing year; Exhibition of two Bayer Films: (1) Artificial Insemination, (2) Myotomy of the retractor muscle of the penis in the bull; Discussion on Draft Veterinary Surgeons Acts (Amendment) Bill.

S. J. Motton, *Hon. Secretary.*

Central Veterinary Society

A MEETING of the Society will be held on Thursday, May 6th, 1943, at the Conway Hall, Red Lion Square, W.C.1, commencing at 2.30 p.m. The President, Capt. H. S. A. Dunn, will occupy the chair.

AGENDA

Routine; Nominations; To Discuss the Draft Veterinary Surgeons Acts (Amendment) Bill; the discussion will be opened by Mr. H. W. Dawes; Any other business.

(Dr. Hare's paper, "Symptoms and Treatment of B.H.S. Infection," has been postponed to permit of the above discussion as a matter of urgency.)

J. W. H. Holmes, *Hon. Secretary.*

Midland Counties Division, N.V.M.A.

A MEETING of the above Association will be held at the Grand Hotel, Birmingham, on Thursday, April 29th, 1943, at 2.30 p.m. The President, C. G. Allen, Esq., will occupy the chair.

H. W. Dawes, *Hon. Secretary.*

Society of Women Veterinary Surgeons

IT is much regretted that, owing to her prolonged indisposition, Miss Bentley has been compelled to relinquish her post as Hon. Secretary of the above Society. Correspondence, etc., concerning the Society should therefore be addressed to her successor, the undersigned, at "Cairnsbee," 29, Celtic Avenue, Shortlands, Kent.

(Mrs.) Erica I. Thomson, *Hon. Secretary.*

Royal Counties Division, N.V.M.A.

AN Ordinary General Meeting of the Association will be held at the National Institute for Research in Dairying, Shinfield, nr. Reading, by kind invitation of the Director, Prof. H. D. Kay, O.B.E., PH.D., D.SC., on Friday, April 30th, starting at 2 p.m.

A Business Meeting will be held in the lecture room from 2 p.m. to 2.45 p.m.

AGENDA

Routine; Nominations and Elections; To elect Representatives on Council N.V.M.A.; Proposed alteration of Rules; Fix place of next meeting; Morbid specimens and cases of interest; Any other business.

After the Business Meeting the programme will be as follows: 2.45-3.45 p.m.—Talk by Dr. S. J. Folley, D.SC., PH.D., on "Some Recent Aspects of Endocrinology, as applied to Farm Animals," including demonstration of specimens, followed by a discussion; 3.45-4.30 p.m.—Look over Institute, laboratories and library; 4.30-5 p.m.—Tea; 5 p.m.—Artificial insemination demonstration by Mr. W. T. Harrow, M.R.C.V.S., and Mr. T. H. French, M.R.C.V.S., followed by a demonstration of the oestroscope, by Dr. G. W. Scott-Blair, M.A., PH.D., A.I.C., and Mr. A. T. Cowie, B.SC., M.R.C.V.S.

NOTICE

Yorkshire Division, N.V.M.A.

A MEETING of the Yorkshire Veterinary Medical Society will be held in the Hotel Metropole, Leeds, on Friday, April 30th, at 2.30 p.m., with the President, Mr. J. M. McKellar, in the chair.

A discussion will take place on the Draft Veterinary Surgeons Acts (Amendment) Bill.

An invitation to attend the meeting is extended to all members of the profession.

AGENDA

Routine; Obituary; Correspondence; Elections and Nominations; Presentation to Mr. S. L. Hignett; Discussion on Refresher Courses; Demonstration by Mr. S. L. Hignett on the Assessment of the value of Bull's Semen; Discussion on the R.C.V.S. Draft Veterinary Surgeons Acts (Amendment) Bill; Any other business.

A. J. Adams, *Hon. Secretary.*

PROFESSIONAL ADVERTISEMENTS

These will be received at 36, GORDON SQUARE, W.C.1 up to TUESDAY MORNING

APPOINTMENTS VACANT

APPLICANTS for posts are requested not to enclose original testimonials when replying to advertisements. Copies answer the same purpose and cause no inconvenience if mislaid.

WANTED, Assistant in large veterinary practice in the Midlands, town and country. Live in.—Allen, 83, Station Road, Tunstall, Stoke-on-Trent.

MALE Assistant wanted, mixed practice, Southern England. Full particulars and references. Please enclose stamped addressed envelope.—Box 956.

WANTED, experienced Assistant in agricultural practice; live out. References and full particulars.—Box 960.

CAPABLE male Assistant required in large agricultural and canine practice in the South of England. Good opportunity for keen and energetic young man.—Apply with testimonials to Box 962.

WANTED, an experienced Assistant for an agricultural and canine practice in South-West England. Intending applicant must have had experience in treatment of bovine sterility, obstetrics and small-animal surgery. Live in. Write full particulars to L. St. Bel Golledge, Kingston House, Sherborne.

YOUNG Veterinarian wanted to assist in field work this summer. Salary £33 per month. Preferably drive own car, for which a mileage rate will be paid.—Apply, with references, to W. Lyle Stewart, King's College, Newcastle-on-Tyne, 2.

VACANCY for energetic and experienced Assistant, with view to Partnership; mixed practice, largely agricultural.—Box 965.

JUNIOR Assistant wanted immediately in mixed agricultural practice in Norfolk; must be competent in Survey work.—Apply with full particulars to Box 966.

WANTED, Assistant, mixed practice. Please send full particulars to S. J. Motton, Rosevean, Penzance.

LOCUM wanted for mixed practice for fortnight from May 8th.—J. Facer, 20, Archers Road, Southampton.

WANTED, experienced Locum Tenens (male) for a week as from May 4th in South-West country. Send full particulars.—Box 969.

WANTED, Assistant for agricultural practice in North Yorkshire. Live out. Particulars to Box 970.

WANTED, male Assistant for mixed country practice. Single. Motorist. Live out? State age, height, experience, etc.—Box 972.

ASSISTANT wanted immediately, agricultural practice. At least three months. Permanency to suitable man.—Carnegie, Brampton, Cumberland.

WANTED, Locum Tenens for mixed practice from middle of June to end of August.—Box 967.

WANTED, Assistant in mixed country practice; live in. Experience, age and references to Box 968.

APPOINTMENTS REQUIRED

EXPERIENCED Scottish graduate desires Assistantship, view to Partnership or Succession, in good mixed practice. Capable of taking full charge. Free shortly. Excellent references.—Box 946.

MARRIED member, six years' experience agricultural and mixed practice, desires appointment view partnership. Well versed sterility and Survey Scheme. Excellent testimonials.—Box 949.

SCOTTISH graduate (July, 1936), capable and well recommended, wishes a Post with reasonable prospect of permanency. Experienced in dairy and horse practice, panel routine and sterility. Married and has own car if required.—Box 954.

MEMBER, married, recent sound experience of agricultural practice, castrates standing, now on the Ministry staff, desiring to return to country practice, seeks Assistantship with a view to Partnership or Succession. Hard worker. Particulars on request.—Box 955.

RECENT graduate desires permanent Assistantship with prospects in South or South-West. Experience sterility and obstetrics. Interview essential.—Box 961.

VETERINARY surgeon, reliable and experienced, is free to undertake Locum Tenens. Own car if necessary.—H. Macdonald, 43, St. David's Hill, Exeter. Tel.: Exeter 3576.

RECENT graduate (female) desires Assistantship, canine or mixed practice.—Box 971.

PRACTICE REQUIRED

WANTED to purchase immediately, sound mixed or mainly agricultural Practice, Southern Counties or South-West. Gross takings £1,000-£1,750. Short-termed Partnership considered.—Complete details to Box 964.

PRACTICE FOR SALE

LUCRATIVE Practice for sale in Midlands, owing to death of owner. Mostly small-animal with fair amount of good-class horse work. Splendid opening for good canine surgeon. Good stock of drugs and instruments. Purchase of premises could be agreed upon. Returns over £2,000, accountants' figures.—Box 957.

MISCELLANEOUS

SENIOR Laboratory Assistant, Veterinary Investigation Department. Salary £100 to £130 (with war bonus) according to experience in pathological laboratory technique. Apply by May 1st, giving full details, to the Bursar, Seale-Hayne Agricultural College, Newton Abbot, Devon.

EX-OFFICER (5 ft. 5 in., chest 37 in.) has for disposal barathea tunic and slacks, Hanover Sq. tailor, hardly worn; also British warm, field boots (size 7, calf 13, leg 16½), pigskin gaiters, cap 6⅞, field glasses Goerz 6x.—Box 959.

MAJOR C. W. TOWNSEND, F.R.C.V.S., Long Stanton, Cambs., telephone Willingham 49, will be pleased to operate on rig horses and scrotal herniae for members of the profession.

VETERINARY LABORATORY SERVICE for veterinary practitioners offered by Dr. Tom Hare, assisted by A. B. Orr, B.SC., M.R.C.V.S., includes post-mortems, laboratory tests, analyses for poisons, the preparation and supply of vaccines, tuberculins, etc. Write for schedule of stock vaccines to Dr. Tom Hare, 529, Finchley Road, London, N.W.3. Telephone: Hampstead 3745.

TUBERCULIN, Mallein, etc., may be obtained by members of the veterinary profession from the Royal Veterinary College. Orders should be addressed to the Department of Preventive Medicine—Temporary address, The Cottage, Streatley, Berks.

MICROSCOPES.—Many superior secondhand instruments and objectives by best makers. 2d. stamp for list. Also bought for cash or part-exchanged.—Chards (Regd.) Specialists, est. 67 years, 10, Devonshire Road, Forest Hill, S.E.23.

PARTURITION OVERALLS

VETERINARY Surgeons can now obtain Parturition Garments, Clinical Coats and Overalls, coupon free, also Wellingtons, on obtaining a permit from Ministry of Agriculture and Fisheries, 2, Fernlea Hotel, St. Annes-on-Sea (for England and Wales), and W.A.E. Comm. (for Scotland). We have small stocks of these goods and can despatch within a few days. Send 1d. for Catalogue.

ERNEST DRAPER & CO., (Dept. "C")
"All British" Works, Northampton